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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/516,821

12/07/2004

Morio Takahashi

8022-1080

7300

466

7590

02/06/2006

YOUNG & THOMPSON
745 SOUTH 23RD STREET
2ND FLOOR
ARLINGTON, VA 22202

EXAMINER

TRAN, HOANG Q

ART UNIT

PAPER NUMBER

2874

DATE MAILED: 02/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/516,821

Applicant(s)

TAKAHASHI, MORIO

Examiner

Hoang Tran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-44 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 December 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 12/07/04, 3/07/05.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Claims 1-44 are pending. Claims 6-9, 25,27-28 are cancelled by applicant.

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Should applicant desire to obtain the benefit of foreign priority under 35 U.S.C. 119(a)-(d) prior to declaration of an interference, a translation of the foreign application should be submitted under 37 CFR 1.55 in reply to this action.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3-5, 10-11, 13, 15-21, 30-42 are rejected under 35 U.S.C. 102(b) as being anticipated by the US Patent to Suzuki (6,031,957).

In terms of Claim 1, Suzuki teaches a substrate (Fig 1); a heater (Abstract); a clad layer (abstract); a bridge section clad layer formed apart from said substrate and said clad layer in a portion corresponding to said heater (Fig 1); a core layer provided inside said bridge section clad layer (Fig 1 [3]), wherein said bridge section clad layer and said core layer form a bridge section optical waveguide in said heater corresponding portion (Fig 1) and said heater is provided inside or outside said bridge section optical waveguide apart from said core layer in said heater correspond portion,

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and generates heat (Fig 1), said clad layer is formed on said substrate through a sacrifice layer (Fig 2 [8]), and said sacrifice layer is formed of the material with a thermal conductivity smaller than that of said substrate. Please note reference show (Fig 2 [8]) is made of silicon and substrate made of quartz.

As for Claim 3, Suzuki teaches the phase shifter of Claim 1, wherein said core layer, said clad layer and said bridge section clad layer are formed of glass material contain quartz (Col 4 [30-40]). Also examiner would like to note waveguides comprising of substrate, clad, and core formed using material of (SiO_2 =quartz) is extremely common in the art.

As for Claim 4, Suzuki teaches the phase shifter of Claim 1, wherein said glass material of said core layer contains germanium (Col [5-15]).

As for Claim 5, Suzuki teaches the phase shifter of Claim 1, wherein said substrate is formed of glass material containing quartz or silicon (Col 3 [20-30]).

As for Claim 10, Suzuki teaches the phase shifter of Claim 1, wherein said heater is provided on said bridge section clad layer (Fig 2).

As for Claim 11, Suzuki teaches the phase shifter of Claim 1, wherein said heater is provided in said bridge section clad layer apart from said core layer (Fig 1).

As for Claim 31, Suzuki teaches the phase shifter of Claim 1, wherein said optical waveguide clad layer has a width wider in the ends of said heater corresponding portion than in a center of said heater corresponding portion (Fig 1).

As for Claim 32, Suzuki teaches the phase shifter of Claim 1, further comprising: a reinforcing beam provided in grooves between said clad layer and said optical

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waveguide clad layer on a way of said heater corresponding portion to support said optical waveguide be connecting said clad layer and said optical waveguide clad layer (Fig 1 [5]).

In terms of Claim 13, Suzuki teaches a substrate (Fig 1); a heater (Abstract); a clad layer (abstract); a clad layer provided directly or indirectly on said substrate (Fig 1 [4c]); a bridge section clad layer formed apart from said substrate and said clad layer in a portion corresponding to said heater, said bridge section clad layer being connected with said clad layer in a portion of said phase shifter other than said heater corresponding portion (Fig 1); a core layer provided inside said bridge section clad layer (Fig 1 [3]), wherein said bridge section clad layer and said core layer form a bridge section optical waveguide in said heater corresponding portion (Fig 1); said heater is provided inside or outside said bridge section optical waveguide apart from said core layer in said heater corresponding portion, and generates heater to change a phase of a light signal propagated in said bridge section optical waveguide (Fig 1); and a supporting section provided in a part of a space between said bridge section optical waveguide and said substrate in an extending direction of said core layer to support said bridge section clad layer (Fig 2 [8]).

As for Claim 15, Suzuki teaches the phase shifter of Claim 13, wherein said supporting section is formed of material with a thermal conductivity smaller than that of said substrate (Fig 2). Examiner would like to note support member (Fig 2 [8]) is made of silicon and substrate is made of quartz as stated in the reference (Col 3 [60-67]).

As for Claim 17, Suzuki teaches the phase shifter of Claim 13, wherein said supporting section is formed of a same material as said clad layer (Col 4 [30-40]). Examiner would like to note in the cited references prior art teaches that optical waveguide structure can be manufactured using quartz.

As for Claim 18 and 19, Suzuki teaches a supporting member (Fig 2 [8]). The examiner would like to note the Claims 18 and 19 are Product-by-Process claims. A product-by-process claim is one in which a product is defined at least in part in terms of the method or process by which it is made. In this case the limitations stated in Claims 18 and 19 refers to a method of forming a element of the product. The use of 102/103 rejections for product-by-process claims has been approved by the courts (See MPEP 2113). In re Marosi, 218 USPQ 289, 292 (Fed. Cir. 1983).

As for Claim 20, Suzuki teaches the phase shifter of Claim 13, wherein said optical waveguide clad layer has a width wider in ends of said heater corresponding portion than in a center of said heater corresponding portion (Fig 1).

As for Claim 21, Suzuki teaches the phase shifter of Claim 13, further comprising: a reinforcing beam provided in grooves between said clad layer and said optical waveguide clad layer on a way of said heater corresponding portion to support said optical waveguide be connecting said clad layer and said optical waveguide clad layer (Fig 1 [5]).

In terms of Claim 16, Suzuki teaches a substrate (Fig 1); a heater (Abstract); a clad layer (abstract); a clad layer provided directly or indirectly on said substrate (Fig 1 [4c]); a bridge section clad layer formed apart from said substrate and said clad layer in

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a portion corresponding to said heater, said bridge section clad layer being connected with said clad layer in a portion of said phase shifter other than said heater corresponding portion (Fig 1); a core layer provided inside said bridge section clad layer (Fig 1 [3]), wherein said bridge section clad layer and said core layer form a bridge section optical waveguide in said heater corresponding portion (Fig 1); said heater is provided inside or outside said bridge section optical waveguide apart from said core layer in said heater corresponding portion, and generates heater to change a phase of a light signal propagated in said bridge section optical waveguide (Fig 1); and a supporting section provided in a part of a space between said bridge section optical waveguide and said substrate in an extending direction of said core layer to support said bridge section clad layer (Fig 2 [8]) said supporting section is formed of material of an etching rate larger than that of said substrate.

As for Claim 33, Suzuki teaches the phase shifter of Claim 16, wherein said supporting section is formed of a same material as said clad layer (Col 4 [30-40]). Examiner would like to note in the cited references prior art teaches that optical waveguide structure can be manufactured using quartz.

As for Claim 34 and 35, Suzuki teaches a supporting member (Fig 2 [8]) and a core layer (Fig1). The examiner would like to note the Claims 34 and 35 are Product-by-Process claims. A product-by-process claim is one in which a product is defined at least in part in terms of the method or process by which it is made. In this case the limitations stated in Claims 34 and 35 refers to a method of forming an element of the product. The use of 102/103 rejections for product-by-process claims has been

approved by the courts (See MPEP 2113). In re Marosi, 218 USPQ 289, 292 (Fed. Cir. 1983).

As for Claim 39, Suzuki teaches the phase shifter of Claim 16, wherein said optical waveguide clad layer has a width wider in ends of said heater corresponding portion than in a center of said heater corresponding portion (Fig 1).

As for Claim 40, Suzuki teaches the phase shifter of Claim 16, further comprising: a reinforcing beam provided in grooves between said clad layer and said optical waveguide clad layer on a way of said heater corresponding portion to support said optical waveguide by connecting said clad layer and said optical waveguide clad layer (Fig 1 [5]).

In terms of Claim 30, Suzuki teaches a substrate (Fig 1); a heater (Abstract); a clad layer (abstract); a clad layer provided directly or indirectly on said substrate (Fig 1 [4c]); a bridge section clad layer formed apart from said substrate and said clad layer in a portion corresponding to said heater, said bridge section clad layer being connected with said clad layer in a portion of said phase shifter other than said heater corresponding portion (Fig 1); a core layer provided inside said bridge section clad layer (Fig 1 [3]), and a supporting section provided in a portion of a space between said bridge section optical waveguide and said substrate in an extending direction of said core layer to support said bridge section clad layer (Fig 2);, wherein said bridge section clad layer and said core layer form a bridge section optical waveguide in said heater corresponding portion (Fig 1), and said heater is provided inside or outside said bridge section optical waveguide apart from said core layer in said heater corresponding

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portion, and generates heater to change a phase of a light signal propagated in said bridge section optical waveguide (Fig 1); and a supporting section provided in a part of a space between said bridge section optical waveguide and said substrate in an extending direction of said core layer to support said bridge section clad layer (Fig 2 [8]) said supporting section is formed of material of an etching rate larger than that of said substrate.

As for Claim 36, Suzuki teaches the phase shifter of Claim 30, wherein said supporting section is formed of a same material as said clad layer (Col 4 [30-40]). Examiner would like to note in the cited references prior art teaches that optical waveguide structure can be manufactured using quartz.

As for Claim 38 and 37, Suzuki teaches a supporting member (Fig 2 [8]) and a core layer (Fig1). The examiner would like to note the Claims 38 and 37 are Product-by-Process claims. A product-by-process claim is one in which a product is defined at least in part in terms of the method or process by which it is made. In this case the limitations stated in Claims 38 and 37 refers to a method of forming an element of the product. The use of 102/103 rejections for product-by-process claims has been approved by the courts (See MPEP 2113). In re Marosi, 218 USPQ 289, 292 (Fed. Cir. 1983).

As for Claim 41, Suzuki teaches the phase shifter of Claim 30, wherein said optical waveguide clad layer has a width wider in ends of said heater corresponding portion than in a center of said heater corresponding portion (Fig 1).

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As for Claim 42, Suzuki teaches the phase shifter of Claim 30, further comprising: a reinforcing beam provided in grooves between said clad layer and said optical waveguide clad layer on a way of said heater corresponding portion to support said optical waveguide be connecting said clad layer and said optical waveguide clad layer (Fig 1 [5]).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 12, 14, 22-24, 26, 29 and 43-44 rejected under 35 U.S.C. 103(a) as being unpatentable over the US Patent to Suzuki (6,031,957).

With respect to Claim 2, Suzuki teaches the phase shifter of claim 1, Suzuki does not teach a sacrifice layer and clad layer containing phosphor and boron. Since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416. **A motivation** to use such a material would be to enhance the power consumption properties as well as reduce manufacturing cost of the phase shifter. Therefore, It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the materials of the Suzuki phase shifter in

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order to increase the power consumption properties and reduce manufacturing cost of the phase shifter.

With respect to Claim 12, Suzuki teaches the phase shifter of Claim 11, Suzuki does not teach wherein the heater is provided under said core layer in said bridge section clad layer. Since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 86 USPQ 70. **A motivation** to rearrange the heater into any location within the waveguide structure would enhance the heat distribution within the phase shifter. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to place the heater at a location where heat distribution would be maximize to reduce the cost of operation of the phase shifter.

With respect to Claim 14, Suzuki teaches the phase shifter of Claim 13 with a supporting member (Fig 2 [8]), Suzuki does not teach wherein a width of a portion of said bridge section optical waveguide where said supporting section is provided is wider than that of a portion of said bridge section optical waveguide where said supporting section is not provided. Since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955). A motivation to reduce the size of the support member would be to decrease the cost of manufacturing. Therefore, it would have been obvious at the time of the invention to use decrease the size of the supporting member to cut the cost of material down during the manufacturing.

With respect to Claim 22 and 29, Suzuki teaches a method of manufacturing a thermo-optic phase shifter comprising:

Forming a sacrifice layer on a substrate, said sacrifice layer having an etching rate larger than said substrate (Fig 2 [8]);

Forming a lower clad layer to cover said sacrifice layer, said lower clad layer having an etching rate smaller than that of said sacrifice layer (Fig 2b);

Forming a core layer in a predetermined portion on said lower clad layer (Fig 2c);

Forming an upper clad layer on said lower clad layer and said core layer (Fig 2d);

Forming a heater in a portion corresponding to said predetermined portion on said upper clad layer (Fig 2e);

Forming grooves in a portion corresponding to said predetermined portion on both sides of said heater to pass through said upper clad layer and said lower clad layer to said sacrifice layer (Fig 2g);

Removing at least a portion of said sacrifice layer through said grooves (Fig 2g);

Wherein said forming an upper clad layer, said forming a core layer and said forming a lower clad layer are carried out by an atmosphere cvd method or pcvd method (Col 4 1-67);

Suzuki does not teach wherein said removing comprises: removing said sacrifice layer to leave a portion for support said lower clad layer in a portion corresponding to said predetermined portion. Since it has been held that omission of an element and its function in a combination where the remaining elements perform the same function as before involves only routine skill in the art. *In re Karlson*, 136 USPQ 184. **A motivation**

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for leaving a portion of sacrifice layer and not complete the entire removing process would be to decrease the time it takes to manufacture the phase shifter. Therefore it would have been obvious at the time of the invention to not completely execute the removing process in order to cut manufacturing time of the phase shifter.

With respect to Claim 23, 24, 43, Suzuki teaches a method of manufacturing a thermo-optic phase shifter comprising:

Forming a sacrifice layer on a substrate, said sacrifice layer having an etching rate larger than said substrate (Fig 2 [8]);

Forming a lower clad layer to cover said sacrifice layer, said lower clad layer having an etching rate smaller than that of said sacrifice layer (Fig 2b);

Forming a core layer in a predetermined portion on said lower clad layer (Fig 2c);

Forming an upper clad layer on said lower clad layer and said core layer (Fig 2d);

Forming a heater in a portion corresponding to said predetermined portion on said upper clad layer (Fig 2e);

Forming grooves in a portion corresponding to said predetermined portion on both sides of said heater to pass through said upper clad layer and said lower clad layer to said sacrifice layer (Fig 2g);

Removing at least a portion of said sacrifice layer through said grooves (Fig 2g);

Removing comprises:

Removing said sacrifice layer to form a space between said lower clad layer and said substrate to connect said grooves with each other (Fig 2g);

Wherein said forming an upper clad layer, said forming a core layer and said forming a lower clad layer are carried out by an atmosphere cvd method or pcvd method (Col 4 1-67);

Suzuki does not teach forming a second lower clad layer and forming a heater in the first lower clad layer. Since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8. It has also been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 86 USPQ 70. **A motivation** to add a second clad layer and place the heater in the first lower clad would be to increase heat distribution and heat confinement. Therefore it would have been obvious at the time of the invention to make such modifications to increase the heating effectiveness of the heater.

With respect to Claim 26 and 44, Suzuki teaches a method of manufacturing a thermo-optic phase shifter comprising:

Forming a sacrifice layer on a substrate, said sacrifice layer having an etching rate larger than said substrate (Fig 2 [8]);

Forming a lower clad layer to cover said sacrifice layer, said lower clad layer having an etching rate smaller than that of said sacrifice layer (Fig 2b);

Forming a core layer in a predetermined portion on said lower clad layer (Fig 2c);

Forming an upper clad layer on said lower clad layer and said core layer (Fig 2d);

Forming a heater in a portion corresponding to said predetermined portion on said upper clad layer (Fig 2e);

Forming grooves in a portion corresponding to said predetermined portion on both sides of said heater to pass through said upper clad layer and said lower clad layer to said sacrifice layer (Fig 2g);

Removing at least a portion of said sacrifice layer through said grooves (Fig 2g);

Wherein said forming an upper clad layer, said forming a core layer and said forming a lower clad layer are carried out by an atmosphere cvd method or pcvd method (Col 4 1-67);

Suzuki does not teach wherein said removing comprises: removing said sacrifice layer by using hydrofluoric acid solution or buffered hydrofluoric acid solution to form a space between said lower clad layer and said substrate to connect said grooves. Since it has been held to be within the general skill of a worker in the art to so select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416. **A motivation** to use HF or BHF as an etching substance would be to reduce manufacturing cost since HF and BHF are readily available. Therefore it would have been obvious at the time of the invention to use the etching substance of HF or BHF in order to reduce manufacturing cost.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoang Tran whose telephone number is 571-272-5049. The examiner can normally be reached on 9:00AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on 571-272-2344. The fax phone

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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ht



Hoang Tran
AU 2874
February 2, 2006



SUNG PAK
PRIMARY EXAMINER